

NON-PUBLIC?: N  
ACCESSION #: 9201020226  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: CRYSTAL RIVER UNIT 3 (CR-3) PAGE: 1 OF 06

DOCKET NUMBER: 05000302

TITLE: Gasket Failures Cause Feedwater Booster Pump And Main Feedwater Pump Trip

EVENT DATE: 11/25/91 LER #: 91-014-00 REPORT DATE: 12/26/91

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 020

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(2)(2)(i)

LICENSEE CONTACT FOR THIS LER:

NAME: W. A. Stephenson, Nuclear Safety TELEPHONE: (904) 795-6486  
Supervisor

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On the evening of November 25, 1991, Crystal River Unit 3 was operating in Mode 1, power operation, at approximately 20 percent power. Plant startup was in progress. The output breakers were closed at 1716. Just after breaker closure, operators noticed the deaerator level was high and increasing. Efforts to restore proper deaerator level were unsuccessful. At 1720 the 'B' Main Feedwater Booster Pump tripped, causing the Main Feedwater Pumps to trip. This caused an anticipatory reactor trip and initiation of Emergency Feedwater.

The Feedwater Booster Pump trip was caused by a false low level signal from the deaerator level switch. The false signal resulted from age related failure of two gaskets on two other level switches sharing common sensing lines. Technicians replaced the gaskets with a different type gasket. Technicians also investigated the response of a deaerator dump

valve which had not operated properly as part of the level control scheme. Instruments were installed to monitor operation of condensate pumps and associated controls during subsequent startup to assure they controlled properly.

Guidance and training is being provided to the operations crew on startup evolutions to assure consistency.

END OF ABSTRACT

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#### EVENT DESCRIPTION

Crystal River Unit 3 was operating in MODE 1, POWER OPERATION, at approximately 20 percent power on the evening of November 25, 1991. Operators were increasing power and preparing to place the Main Electric Generator EL, GEN! on line. Reactor startup occurred on November 24, 1991. The "B" Condensate Pump SD, P! and the "B" Feedwater Booster Pump SD, P!, and the "B" Main Feedwater Pump SJ, P! were operating. The "A" Main Feedwater Pump turbine SJ, TRB! was latched, and the pump was running in recirculation. The pump was not supplying flow to the Steam Generators AB, SG!.

During the initial power escalation, operators controlled condensate flow and Deaerator SD, DEA! level by manually throttling Condensate System SD! valve CDV-242 SD, V! and adjusting Condensate Pump speed. (Please refer to Figure 1.) Valves CDV-43 SD, SHV! and CDV-44 SD, SHV! were closed. For normal operations above approximately 20% power, CDV-43 and CDV-44 are open, CDV-242 is closed, and Condensate Pump speed is controlled automatically.

At approximately 1705, with the plant at approximately 20 percent power, operators reduced Condensate Pump speed and condensate flow in preparation for realigning Condensate System SD! valves. It was necessary to reduce pump speed to prevent a surge in condensate flow when CDV-43 was opened. At 1710, operators opened CDV-43, and closed CDV-242. Deaerator level decreased approximately 10 inches during this time. Once valves were repositioned, operators increased condensate flow and placed Condensate Pump control into automatic. Automatic controls continued increasing Deaerator level back towards its setpoint. At this point Condensate Pumps appeared to be functioning properly.

Output Breakers EL, BKR! were closed at 1716:35. Just after the breakers closed, operators noticed that Deaerator level was high and continuing to increase. Operators took manual control of the operating

Condensate Pump and reduced pump speed in order to reduce condensate flow and Deaerator level. These efforts were unsuccessful. The Condensate Pump tripped at 1719:49 due to high Deaerator level. At 1720:14 a false indication of low Deaerator level caused the "B" Main Feedwater Booster Pump to trip. Both Main Feedwater pumps tripped automatically upon loss of the Booster Pump.

Deaerator level is monitored by several instruments. (Please refer to Figure 2.) Level switch FW-4-LS SD, 71! provides a "Trip" signal to the Condensate Pumps based on high Deaerator level. Level switch FW-6-LS SD, 71! provides the operators with high and low Deaerator level alarms. This switch also issues an "Open" signal to Deaerator Dump Valve HDV-83 SD, SHV!. This valve directs flow to the Main Condenser SG, COND!. Level switch FW-311-LS SD, LS! issues a "Trip" signal to the Feedwater Booster Pumps based on low Deaerator level. This trip signal is intended to protect the pumps from operating with insufficient suction head.

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The gaskets for FW-4-LS and FW-6-LS gaskets failed. This allowed water in their sensing lines to begin flashing to steam. Since these two switches share common sensing lines with FW-311-LS, flashing in the lines allowed the FW-311-LS float to drop, actuating the switch and issuing a false low level "Trip" signal to the "B" Feedwater Booster Pump. The Main Feedwater Pumps tripped as designed when the one running Booster Pump tripped. The FW-4-LS and FW-6-LS gaskets were made from asbestos sheet and found to be aged.

During the initial phases of this event, while Deaerator level was increasing, valve HDV-83 should have opened to aid in level control. However, the valve did not open, thus compounding Deaerator level control problems. During recovery from the trip, operators found that the breaker which feeds HDV-83 was tripped.

Reactor power was slightly above 20 percent when both Main Feedwater Pumps Tripped. The Reactor Protection System (RPS) JC! includes an anticipatory function that will trip the Reactor AC! under these conditions. Therefore, the Main Feedwater Pump trip resulted in a Reactor trip. The Emergency Feedwater system was also initiated due to loss the of both Main Feedwater Pumps.

## CAUSE

The cause of this event is failure of the operators to monitor and assure the condensate/feedwater flow had adequately stabilized prior to

performing another evolution that demanded their attention, closing the output breakers. Contributing factors included the failure of the gaskets on the level switches and improper operation of dump valve HDV-83.

## EVENT ANALYSIS

All safety systems functioned as designed during this event. Adequate core cooling was maintained at all times. When the Main Feedwater Pumps tripped, the Nuclear Instruments IG, DET! that feed RPS channels "A," "C," and "D" were indicating slightly greater than 20% power. The Instrument feeding RPS Channel "B" was indicating just under 20% power. Therefore, only RPS channels "A," "C," and "D" tripped.

The Emergency Feedwater Initiation and Control (EFIC) System JE! initiated as designed when the Main Feedwater Pumps tripped. Steam Generator levels were below the level control setpoint when Emergency Feedwater (EFW) flow began. The EFIC system began controlling EFW flow at 700 to 800 gpm to restore Steam Generator levels. Because decay heat levels were low, this flow rate caused the Reactor Coolant System AB! to cool more quickly than desired. Therefore, operators took manual control of Emergency Feedwater flow to limit the rate of cooldown.

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## CORRECTIVE ACTIONS

Guidance and training is being provided to the operating crews to assure consistent use of successful operating practices.

Following the Reactor trip, plant technicians replaced the FW-4-LS and FW-6-LS asbestos gaskets with Flexitallic gaskets. Florida Power Corporation will evaluate the need for additional preventive maintenance requirements related to this equipment.

Technicians tested HDV-83 to determine if there were any mechanical or electrical problems that would have caused the breaker to trip. No such problems were found. Plant personnel found no malfunctions associated with other components fed from the same breaker.

Instruments were installed to monitor operation of the "B" Condensate Pump and its associated controller during power escalation following restart. No malfunctions were observed.

## PREVIOUS SIMILAR EVENTS

This was the second reactor trip caused by loss of one or more Main Feedwater Booster Pumps. The first trip occurred following a power runback following loss of a single Booster pump.

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Figure 1 "Partial Condensate System Schematic" omitted.

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Figure 2 "Deaerator Instrumentation Schematic" omitted.

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Florida Power  
C O R P O R A T I O  
CrystaL River Unit 3  
Docket No. 50-302

December 26, 1991  
3F1291-15

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D. C. 20555

Subject: Licensee Event Report (LER) 91-014-00

Dear Sir:

Enclosed is Licensee Event Report (LER) 91-014-00 which is submitted in accordance with 10 CFR 50.73.

Sincerely,

Rolf C. Widell  
Director, Nuclear Operations Site Support

WLR:mag

Enclosure

xc: Regional Administrator, Region II  
Project Manager, NRR  
Senior Resident Inspector

A Florida Progress Company

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